

Message

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Sent: 2/8/2017 6:01:59 PM
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CC: steve [steve@uxopro.com]
Subject: 2017-2-8 - Williams AFB - Comments - Final ST012 Field Variance Memorandum #5A , dated Jan 24 2017

For your discussion and action – ADEQ's contractor UXO Pro and their support partner Praxis Environmental have followed along the ST012 Field Variance Memorandum #5 evolution. Some comments have been placed forward at organized discussion, others not. This email is to submit a growing comment collection for your discussion and action.

The Final ST012 Field Variance Memorandum #5A, dated Jan. 24, 2017 is comment reference document.

General Comments:

1. Assuming the modified extraction well network operates as intended, the former thermal treatment zones are expected to reside within a predominantly stagnant area amid the array of extraction wells. Under this condition, the majority of the TTZs will remain at elevated temperatures for an extended period (e.g., several years). This impact may or may not be detrimental to future efforts, dependent upon the actions taken.
2. In the modified network, Table 5 indicates only one of six UWBZ wells (UWBZ27) exceeds an estimated pumping rate of 2 gpm, and only two of eight LSZ wells (LSZ13, LSZ51) exceed an estimated pumping rate of 2.5 gpm. Hence, the restriction of utilizing only wells below 175 F for extraction could be eased by employing additional high temperature pneumatic pumps with a maximum pumping rate exceeding 3 gpm as was done in the Cobble Zone.
3. The previous attempt at a pump-and-treat remedy was circa 1992 when water levels were near the bottom of the LSZ. As a result, significant water could not be produced; however, water production and drawdown are no longer an issue. Therefore, the original basis for abandoning the pump-and-treat remedy no longer exists and the technology should be re-evaluated.

Specific Comments:

4. The model results for the modified extraction well network were presented for a single scenario. The sensitivity to increases or decreases in pumping rates should be evaluated to assess effects on the capture zone in each of the three zones considered.
5. If containment is deemed inadequate by subsequent field monitoring, can the modified network be operated in a manner to achieve the desired containment by altering/increasing flow rates without installing new wells?
6. What are the expected impacts from the containment pumping on dissolved phase concentrations in monitoring wells located outside the capture zones?
7. Considerations for increasing LNAPL recovery associated with the groundwater pumping network for hydraulic containment in each zone are provided below.
 - a. **Cobble Zone (CZ):** Limited NAPL recovery has occurred since the cessation of SEE and little information was collected during SEE to assess NAPL recovery from the CZ. The proposed extraction well field in FVM 5A appears appropriate for containment. Yet, the top of the CZ is open to the bottom of the vadose zone where active soil vapor extraction is occurring. During December 2016 and January 2017, the average mass recovery in the SVE system was approximately 1,900 lbs/day (~300 equiv. gallons per day). Prior to SEE and without the operation of the FlameOx, the SVE system removed on average 263, 248 and 284 pounds per day in 2013, 2014 and 2015. Hence, the residual heating from SEE continues to enhance the volatilization of hydrocarbons over previous operations. A potential source of the additional vapors is LNAPL atop the water table in the CZ; this source was also indicated through mass balances during SEE operations. As a second point of comparison, the last five weeks of SEE operation (April 2016) averaged 3,850 lbs/day of hydrocarbon recovery (including NAPL recovery) from all three zones. The current rate is only about half the final SEE mass rate even though SVE extracts primarily

from the middle and deep vadose zone (including the top of the CZ) with no extraction from the UWBZ or LSZ.

i. CZ Recommendations:

1. Continue with the status quo and implement hydraulic containment.
2. Review SVE operational data (PID/FID readings from individual vapor extraction wells) to confirm or refute that LNAPL on the CZ water table surface is a source for SVE.

b. **Upper Water Bearing Zone (UWBZ):**

i. UWBZ Recommendations:

1. Consider moving the extraction wells into a tighter ring around the TTZ and pumping at higher rates.
2. If this is deemed impractical at this time (already installed or unacceptable temperatures), consider placing a high temperature, top-loading pneumatic pump in well UWBZ05 (or UWBZ06 or UWBZ23) dedicated to NAPL recovery. This type of pump can be set to maintain a water level (e.g., a couple of feet below the surface created by the containment pumping) that emphasizes LNAPL recovery over water extraction. Such pumping should have minimal impact on the effectiveness of the containment pumping and ensure capture.

c. **Lower Saturated Zone (LSZ):**

i. Lower Saturated Zone Recommendations:

1. Consider moving the extraction wells into a tighter ring around the TTZ and pumping at higher rates.
2. If this is deemed impractical at this time (already installed or unacceptable temperatures), consider placing high temperature, top-loading pneumatic pumps in wells LSZ02 and LSZ12 dedicated to NAPL recovery. As with the UWBZ recommendation, the pumps can be set to maintain a water level that emphasizes LNAPL recovery over water extraction to have minimal impact on the containment pumping.

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